

## Human Immunodeficiency Virus Infection and Diffuse Polyneuropathy Implications for Rehabilitation Medicine

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Patients at various stages of human immunodeficiency virus (HIV) infection require rehabilitation services. These patients present problems for each of the disciplines in a rehabilitation team, and all team members must confront the psychosocial and ethical issues involved with the disease. Patients with HIV infection may have polyneuropathy with multisystem involvement, including dysphagia, autonomic dysfunction, respiratory failure, bowel and bladder dysfunction, generalized weakness, a painful sensory neuropathy, and depression. Guidelines are presented for determining if inpatient rehabilitation or other settings are appropriate. Case management is a valuable strategy for the rehabilitation of patients with this complicated disorder.

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The acquired immunodeficiency syndrome (AIDS) has been likened to the Black Death and the influenza pandemic, with good reason. Since the first reports of cases of atypical pneumonia and sarcoma in the early 1980s,<sup>1</sup> 117,800 cases of AIDS have been reported to the Centers for Disease Control as of March 1990.<sup>2</sup> About 1 million people in the United States<sup>2</sup> and between 5 and 10 million people throughout the world are thought to be seropositive for the human immunodeficiency virus (HIV).<sup>3</sup> Projections include 270,000 cases of AIDS in the United States by 1992, of which 172,000 will require medical care.<sup>4</sup>

An increasing number of patients at various stages of infection with HIV will enter the medical system and the field of rehabilitation. Asymptomatic patients may sustain injuries, such as to the spinal cord.<sup>5</sup> In addition, a variety of neurologic complications are related to HIV infection. Physiatrists may see HIV-infected patients for electromyography or pain management, and, finally, general debility associated with AIDS may require rehabilitative services. For each of the disciplines in a rehabilitation team, patients with AIDS present special challenges; all team members must confront the psychosocial and ethical issues involved with AIDS.

In this article I describe a representative case of HIV infection and polyneuropathy in a patient who was treated in a rehabilitation setting, and I discuss implications for rehabilitation medicine.

### Report of a Case

The patient, a 29-year-old man with a history of intravenous drug abuse, was admitted with fever, chills, sweats, epigastric pain, adenopathy, and splenomegaly. A year previously he had had lower extremity weakness that resolved spontaneously after a month. Soon after admission he had the development of progressive ascending weakness, a wide-based and unsteady gait, hyporeflexia, lower extremity dys-

esthesias, dysphagia, and orthostatic hypotension. Because of decreased vital capacity and dyspnea, an endotracheal tube was placed. Electrodiagnostic studies revealed a diffuse polyneuropathy, including prolonged distal latencies of the facial nerve. An HIV test was positive by the Western blot method. Hepatitis B surface antibody and anti-hepatitis A antibody were present. A purified protein derivative test and an anergy panel showed no response. He was placed on a regimen of broad-spectrum antibiotics and transferred for plasmapheresis.

On examination, he was emaciated, febrile, and had tachycardia. Lymphadenopathy and mild hepatosplenomegaly were present. His gag and cough reflexes were diminished, as was facial muscle strength. Strength was grade 2/5 in the upper extremities and 1/5 in the lower, with decreased tone. Sensation was intact to pinprick and proprioception, but light touch was decreased below the ankles and dysesthesias were present in the legs. Deep tendon reflexes were absent.

Because of recurrent fevers, sputum production, and elevated liver function test values, several blood and urine specimens were cultured and a bronchoscopy, bone marrow aspiration, and a liver biopsy were done. The results of all studies were negative or nonspecific. He received numerous courses of antibiotics during his hospital stay, including a course for oxacillin-resistant *Staphylococcus aureus*. The latter infection necessitated isolation procedures, and all therapy was provided with the use of gowns, masks, and gloves.

Methadone maintenance was begun because of his history of drug abuse, and tricyclic antidepressant therapy was started after a psychiatric consultation. The dysesthesias in his legs resolved. A nasogastric tube had been placed because of dysphagia; from a speech pathologist he received thermal stimulation treatments of the oropharynx to help normalize the swallow reflex. A dietician recommended a

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# ABBREVIATIONS USED IN TEXT

AIDS = acquired immunodeficiency syndrome

CNS = central nervous system

HIV = human immunodeficiency virus

high-caloric intake because of his hypermetabolic state. Bowel incontinence was a problem initially and was managed with bowel care every other day. A Foley catheter had been placed during the initial management, and this was discontinued when postvoiding residual measuring showed no signs of urinary retention. Extubation was carried out after a month, and the tracheostomy tube was removed after another month; during this time he required frequent respiratory therapy and arterial blood gas monitoring.

Occupational therapy was given to aid in activities of daily living, and adaptive devices were provided. Physical therapy was given to prevent the formation of contractures. Gradually the patient started to ambulate between the parallel bars, then with a walker. A rehabilitation psychologist gave supportive therapy and taught relaxation techniques for the patient's anxiety attacks. A social worker was trying to arrange discharge to a halfway house when, because of psychosocial problems, the patient left the hospital against medical advice.

## Discussion

The nervous system is often affected in HIV disease. The virus has been identified in brain, spinal cord, peripheral nerve tissues, and cerebrospinal fluid.<sup>6,7</sup> In addition, antibodies to HIV have been found in cerebrospinal fluid.<sup>8,9</sup> The AIDS dementia complex has been found in 65% of patients with AIDS,<sup>10</sup> with forgetfulness, poor concentration, and slowness of thought the most common symptoms. Behavioral changes such as apathy and depression occur in nearly 40% and are the presenting manifestation in about 20%. Even in asymptomatic seropositive patients, neuropsychological and magnetic resonance imaging abnormalities occur.<sup>11</sup> The course of dementia is progressive over several months to more than a year.<sup>12</sup> Late findings include ataxia, weakness, tremor, myoclonus, seizures, incontinence, and akinetic mutism. The patient in this report may have been affected by the AIDS dementia complex.

Chronic demyelinating and axonal polyneuropathies are the next most common condition, and symptoms are reported by nearly 50% of patients.<sup>13</sup> These consist of weakness, sensory loss, dysesthesias, cranial nerve dysfunction, and autonomic involvement.<sup>14,15</sup> Vacuolar myelopathy can cause ataxia, spastic paresis, incontinence, and posterior column signs, but patients with mild lesions may be asymptomatic.<sup>16</sup> Primary HIV infection may result in acute aseptic meningitis with fever, headache, and cranial nerve signs.<sup>17</sup>

A variety of other neurologic conditions may be diagnosed. Clinical findings besides those mentioned earlier include central nervous system (CNS) toxoplasmosis, cryptococcal meningitis, primary CNS lymphoma, herpes simplex encephalitis, viral myelitis (cytomegalovirus and varicella), candidal brain abscess, progressive multifocal leukoencephalopathy, Kaposi's sarcoma, and metastatic lymphoma.<sup>18</sup> Cerebral granulomatous angiitis,<sup>19</sup> polymyositis,<sup>20</sup> and the Guillain-Barré syndrome<sup>21</sup> have also been reported.

This array of conditions is a challenge to rehabilitation medicine. All manifestations of chronic polyneuropathy

were present in this patient, and he required the assistance of all members of the rehabilitation team. Physical therapy should focus on preventing further deterioration. Contractures and muscle wasting can be prevented with active and passive range-of-motion exercises, progressive mobilization with assistive devices, and gait training. Frequent monitoring of vital signs is necessary, especially when a patient has autonomic instability as in this case. Neurodevelopmental training and proprioceptive neuromuscular facilitation may help.<sup>22</sup> Orthotic devices may be required; this patient wore lower extremity splints in bed to prevent contractures and was fitted for an ankle-foot orthosis before he left. Occupational therapy provided the patient with wrist splints to prevent contractures and various adaptive devices to help with activities of daily living. These included a universal cuff for eating; a device to help don socks, a long-handled shoe horn, dressing stick, and button hook for dressing; a long-handled sponge for hygiene; a wedge to build up a pen; a shower chair; a raised toilet seat; and grab bars for the bathroom at home. Occupational therapy can be valuable in maintaining function with adaptive devices, providing therapeutic activities, and teaching energy conservation.<sup>23</sup>

The neurologic effects of AIDS can present a variety of problems for speech pathologists.<sup>24</sup> Because there was a possibility of aspiration pneumonia with this patient, oral intake was initially allowed only under the supervision of a speech pathologist, and the diet was gradually advanced. The dementia complex alone can severely disrupt communication; cranial neuropathies and opportunistic infections affect speech and swallowing; sensorineural hearing losses result from infection of the auditory pathway. In addition, the eardrum can be damaged by Kaposi's sarcoma, herpes zoster, and fungal external otitis. Serous otitis media is common and results in a conductive hearing loss.<sup>24</sup> Nearly half of AIDS patients have a multifactorial hearing loss.<sup>25</sup> Oral manifestations include viral infections such as herpes virus, Epstein-Barr virus, and thrush due to *Candida* species. Hypopharyngeal and laryngeal infections can lead to hoarseness and airway obstruction.<sup>24</sup> These complications have profound implications for speech, swallowing, and nutrition.

Peripheral neuropathies can be caused by HIV infection but can also occur with chemotherapy.<sup>26,27</sup> This patient's dysesthesias resolved with the administration of amitriptyline hydrochloride, but they are often refractory to treatment.<sup>28</sup> Treatment with electrical stimulation and laser therapy, in conjunction with relaxation techniques, has been of benefit.<sup>22</sup> In the terminal stages, pain management is difficult and requires the liberal use of sedatives and analgesics.<sup>29</sup>

Cardiac disease in association with AIDS may determine the exercise prescription in these patients.<sup>30</sup> Kaposi's sarcoma can metastasize to the heart; myocarditis has been associated with cytomegalovirus, cryptococcosis, or toxoplasmosis; and pericarditis can occur with tuberculosis and *Pneumocystis carinii* pneumonia. Congestive cardiomyopathy has been described in the absence of these infections or sarcoma, suggesting a direct effect of the virus on cardiac function. These findings should modify the approach to prescribing exercise in patients with AIDS. The bicycle ergometer has been useful, with progressive-resistance exercises on alternate days. Most patients have resting tachycardia; a target heart rate is obtained by multiplying the difference between maximum and resting pulse by 0.6 and adding the result to the resting rate.<sup>22</sup>

Evidence of *P carinii* pneumonia is found in 85% of patients with AIDS and pulmonary disorders; it can occur with other infections.<sup>31</sup> Many patients also have coexistent Kaposi's sarcoma of the lung. With lung involvement, debilitation is inevitable. Monitoring of vital capacities, incentive spirometry, and chest physical therapy are indicated. Breathing exercises for relaxation and pursed-lip breathing for the fibrosis associated with *P carinii* pneumonia are helpful. Energy conservation techniques maintain functional independence. Strategies for pulmonary rehabilitation in this population are reviewed by Celli.<sup>32</sup> Humidification, bronchodilators, and supplemental oxygen may be necessary. When prescribing exercises, the profound fatigue experienced by these patients must be considered. Physical activity often helps to reduce their stress and helps maintain a level of strength and endurance that allows them to continue performing activities of daily living.

Progressive weight loss is striking in patients with opportunistic infections due to a variety of organisms and sometimes cannot be reversed even with prolonged total parenteral nutrition.<sup>33,34</sup> Severe diarrhea may result in electrolyte imbalances, and hydration must be maintained. The oral and neurologic complications mentioned earlier also interfere with nutrition. The neurologic complications can cause incontinence and require a bowel rehabilitation program. Consultation with a clinical nutritionist can be of great help.

The multitude of neurologic problems described earlier can result in urinary incontinence, as in this patient. Various skin lesions can involve the genitalia, which may further complicate bladder management. Urologic consultation should be obtained.<sup>35</sup> Some patients may require a condom catheter, and others may need indwelling or intermittent catheterization.

The hematologic system is the primary target of HIV infection, and every cell line is affected. Anemia contributes to general wasting. As a result, patients become progressively deconditioned and require the rehabilitative exercises described earlier. Because of platelet abnormalities, bleeding precautions must be observed during these exercises. Lymphopenia and neutropenia contribute to myriad infectious complications; their management in the rehabilitation setting is reviewed by Mayer.<sup>36</sup>

Psychosocial and psychiatric problems invariably occur in these patients. They often face social and emotional isolation because of the stigma of AIDS. Society usually associates the disease with homosexuality and drug abuse, which have their own stigmas. Finally, AIDS is a terminal disease; some patients feel they "deserve" to die and blame themselves,<sup>37</sup> which often leads to depression, anger, and suicide attempts. Clinical presentations can range from mild chronic depression to acute psychosis.<sup>38</sup> Psychiatric consultation is necessary to manage the acute problem and also to help with discharge planning and issues of mental competence. Psychotherapy and group discussions can be helpful.<sup>39</sup> Some patients may require pharmacotherapy, including benzodiazepines for anxiety and antidepressants given at bedtime to help with insomnia.<sup>40</sup> This patient benefited from taking amitriptyline for his depression and also perhaps for his dysesthesias.

Because HIV-related illnesses become chronic, they are similar to the disabilities traditionally treated in rehabilitation medicine. The direct effects of HIV infection and the immunocompromised state often lead to diagnoses com-

monly seen in the rehabilitation setting. Neurologic conditions such as hemiplegia, quadriplegia, paraplegia, radiculopathies, and diffuse neuropathies can benefit from a comprehensive, interdisciplinary, inpatient rehabilitation program. Musculoskeletal conditions often accompany these neurologic problems but may be the primary diagnosis for some patients with HIV infection. More than 70% of patients with AIDS were found to have rheumatologic involvement ranging from arthralgias to polymyositis, and some would be good candidates for inpatient rehabilitation.<sup>41</sup> Vascular or infectious complications related to HIV infection or to intravenous drug use<sup>42</sup> may lead to amputations. Prosthetists are becoming aware of the subtleties involved in developing artificial limbs for these patients.<sup>43</sup> Pulmonary and cardiac rehabilitation has been useful in a variety of conditions.<sup>44,45</sup> As noted earlier, some aspects of these models have already been used with patients who have HIV infection and have resulted in improved functional capacity and quality of life.

The waxing and waning nature of AIDS is often described as an obstacle to rehabilitation. But the same sort of problem, on a different time scale, is seen with multiple sclerosis. It is true that life expectancy after the diagnosis of multiple sclerosis (mean of 35 years) is greater than the median of 9.8 years for progression from HIV infection to AIDS,<sup>46,47</sup> but, as noted earlier, there is a wide range of survival after the onset of AIDS, and treatments are improving rapidly.

One of the first challenges for rehabilitation medicine is to educate other health-care workers about the potential benefit of rehabilitation. A psychiatric consultation should be obtained early in a patient's course, before complications of prolonged bed rest such as deconditioning and contractures occur. The consultation should address transferring the patient to an inpatient unit of the hospital or to a rehabilitation hospital. Criteria for Medicare coverage include the following<sup>48</sup>: "A hospital level of care" is appropriate if a "patient needs a relatively intense program that requires a physician-coordinated multidisciplinary team approach to improve the ability to function." The patient must receive at least three hours a day of physical, occupational, and speech therapy. Some

degree of mental impairment is not *per se* a basis for concluding that a multidisciplinary team evaluation is not warranted. . . . It is sometimes possible to correct or significantly alleviate both the mental and physical problems.

Patients who are able to go home often benefit from continued rehabilitation services. They may need only an hour of therapy a day, in contrast to the inpatient guidelines of three hours. If a patient is ready for discharge after acute care or after a course of inpatient rehabilitation, staff in physical, occupational, and speech therapy should help ensure the continuity of services through the Visiting Nurse Association. A discharge summary from each of these disciplines will provide guidance to whatever community services are available, including case management programs. The teaching of care givers is also a vital component of discharge planning and may help reduce complications in the outpatient setting. Therapists can do home evaluations to determine if any environmental modifications are needed and help obtain necessary equipment such as wheelchairs and adaptive devices. When funds for purchasing adaptive equipment are not available, as is often the case, various materials can be modified. For instance, a physical therapist reports that foam used as packing material has been improvised for positioning devices

and that friends and family members have sometimes constructed assistive devices for indigent patients (J. Bourgeois, PT, University of Connecticut, oral communication, February 1990). The AIDS Action Committee of Massachusetts rents wheelchairs.<sup>49</sup> Often an initial evaluation at home by physical and occupational therapists can make substantial improvements in the functional status of these patients. The principles of energy conservation and work simplification are vital for preserving their endurance.

When a patient is ready to leave the hospital, a case management system can play a crucial role. Such a system may include assessment, planning, and coordinating a variety of services; monitoring the need for these services, and following up on the patient's medical and psychosocial condition.<sup>50,51</sup> An effective case manager provides the link between hospital and community care and between acute medical and rehabilitative services. Rehabilitation professionals will need to be closely involved in the case management networks that are currently being developed. As noted earlier, rehabilitation involvement in home care is also imperative. This may become more feasible with shifts in public policy. The American Medical Association's Council on Scientific Affairs recently commented that "One new group of home care patients for whom adaptive work strategies and retraining programs are particularly important are patients with AIDS."<sup>52</sup>

## Summary

Because of improved treatments, rehabilitation medicine will become more involved in the care of patients with HIV infection. Many disabilities may be associated with HIV infection and require inpatient and outpatient rehabilitation. Funding mechanisms must be developed by government and private payers to pay for the care and rehabilitation of patients with HIV disease.

Health-care workers in rehabilitation medicine need to educate their colleagues and the public about the possible benefits of rehabilitative therapy, not only for patients' quality of life but for society as a whole. Current criteria for the appropriateness of rehabilitation services may be applied to HIV infection; a prognostic system may help select patients for inpatient and outpatient rehabilitation. Case management systems could play a vital role in providing appropriate services. Specialists in rehabilitation medicine should play a role in educating the public and policy makers. Psychosocial issues of health care professionals<sup>53</sup> and their concerns about safety<sup>54</sup> should also be addressed. Finally, there are legal<sup>55</sup> and ethical<sup>56</sup> responsibilities related to rehabilitation medicine and the provision of care in a humane and compassionate manner.

## REFERENCES

- Centers for Disease Control (CDC): Kaposi's sarcoma and pneumocystis pneumonia among homosexual men—New York City and California. *MMWR* 1981; 30:305-308
- CDC: Estimates of HIV prevalence and projected AIDS cases: Summary of a workshop, October 31-November 1, 1989. *MMWR* 1990; 39:110-112, 117-119
- Chin J, Mann J: Global surveillance and forecasting of AIDS. *Bull World Health Organ* 1989; 67:1-7
- Hay JW: Projecting the medical costs of HIV/AIDS: An update with focus on epidemiology. In *New Perspectives on HIV-related Illness: Progress in Health Services Research*. Hyattsville, Md, National Center for Health Services Research, September 1989
- Meythaler JM, Cross LL: Traumatic spinal cord injury complicated by AIDS-related complex. *Arch Phys Med Rehabil* 1988; 69:219-222
- Shaw GM, Harper ME, Hahn BE, et al: HTLV-III infection in brains of children and adults with AIDS encephalopathy. *Science* 1985; 227:177-182
- Ho DD, Rota T, Schooley RT, et al: Isolation of HTLV-III from cerebrospinal fluid and neural tissues of patients with neurologic syndromes related to the acquired immunodeficiency syndrome. *N Engl J Med* 1985; 313:1493-1497
- Goudsmit J, Wolters EC, Bakker M, et al: Intrathecal synthesis of antibodies to HTLV-III in patients without AIDS or AIDS-related complex. *Br Med J [Clin Res]* 1986; 292:1231-1234
- Resnick L, diMarzo-Veronesi F, Schüpbach J, et al: Intra-blood-brain-barrier synthesis of HTLV-III-specific IgG in patients with neurologic symptoms associated with AIDS or AIDS-related complex. *N Engl J Med* 1985; 313:1498-1504
- Navia BA, Jordan BD, Price RW: The AIDS dementia complex: I. Clinical features. *Ann Neurol* 1986; 19:517-524
- Dalakas M, Wichman A, Sever J: AIDS and the nervous system. *JAMA* 1989; 261:2396-2399
- Navia BA, Price RW: The AIDS dementia complex as the presenting or sole manifestation of HIV infection. *Arch Neurol* 1987; 44:65-69
- De La Monte SM, Gabuzda DH, Ho DD, et al: Peripheral neuropathy in the acquired immune deficiency syndrome (AIDS). *Lab Invest* 1987; 56:17A
- Lipkin WI, Parry G, Kiprov D, Abrams D: Inflammatory neuropathy in homosexual men with lymphadenopathy. *Neurology* 1986; 35:1479-1483
- Cornblath DR, McArthur JC, Kennedy PG, Witte AS, Griffin JW: Inflammatory demyelinating peripheral neuropathies associated with HTLV-III infection. *Ann Neurol* 1987; 21:32-40
- Petito CK, Navia BA, Cho ES, Jordan BD, George DC, Price RW: Vacuolar myelopathy pathologically resembling subacute combined degeneration in patients with the acquired immunodeficiency syndrome. *N Engl J Med* 1985; 312:874-879
- Snider WD, Simpson DM, Nielsen S, Gold JW, Metroka CE, Posner JB: Neurological complications of acquired immune deficiency syndrome: Analysis of 50 patients. *Ann Neurol* 1983; 14:403-418
- Levy RM, Bredesen DE, Rosenblum ML: Neurological manifestations of AIDS: The experience at UCSF and review of the literature. *J Neurosurg* 1985; 62:475-495
- Yankner BA, Skolnik P, Shoukimas GM, Gabuzda DH, Sobel RA, Ho DD: Cerebral granulomatous angiitis associated with isolation of human T-lymphotropic virus type III from the central nervous system. *Ann Neurol* 1986; 20:362-364
- Dalakas MC, Pezeshkpour GH, Gravel M, Sever JL: Polymyositis associated with AIDS retrovirus. *JAMA* 1986; 256:2381-2383
- Vendrell J, Heredia C, Pujol M, Vidal J, Blesa R, Graus F: Guillain-Barré syndrome associated with seroconversion for anti-HTLV-III (Letter). *Neurology* 1987; 37:544
- Galantino ML, Mukand J, Freed MM: Physical therapy management of patients with HIV infection. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 257-282
- Pizzi M, Mukand J, Freed MM: HIV infection and occupational therapy. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 283-326
- Flower WM: Communication problems in patients with AIDS. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 327-342
- Marcusen DC, Sooy CD: Otolaryngologic and head and neck manifestations of AIDS. *Laryngoscope* 1986; 95:401-405
- Molina JM, Groopman JE: Bone marrow toxicity of dideoxyinosine (Letter). *N Engl J Med* 1989; 321:1478
- Merigan TC, Skowron G, Bozzette SA, et al: Circulating p24 antigen levels and responses to dideoxycytidine in human immunodeficiency virus (HIV) infections. *Ann Intern Med* 1989; 110:189-194
- McArthur JH, McArthur JC: Neurological manifestations of acquired immunodeficiency syndrome. *J Neurosci Nurs* 1986; 18:242-249
- Abrams DI, Dilley JW, Maxey LM, Volberding PA: Routine care and psychosocial support of the patient with AIDS. *Med Clin North Am* 1986; 70:707-720
- Hsia J: HIV-associated heart disease. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 95-118
- Rosen MJ: Pulmonary complications of HIV infection. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 119-130
- Celli BR: Pulmonary rehabilitation of the patient with AIDS. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 131-140
- Weinstein WM: The gastrointestinal tract as a target organ. In Gottlieb MS (Moderator): *The Acquired Immunodeficiency Syndrome*. Ann Intern Med 1983; 99:210-212
- Wilcox CM, Cello JP: Gastrointestinal complications associated with AIDS. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 141-160
- Kaplan SA, Benson MC: Urologic manifestations of AIDS. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 179-188
- Mayer KH: Infectious complications in patients with AIDS and HIV infection. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 33-54
- Dilley JW, Ochtill HN, Perl M, Volberding PA: Findings in psychiatric consultations with patients with acquired immune deficiency syndrome. *Am J Psychiatry* 1985; 142:82-86
- Perry S, Jacobsen P: Neuropsychiatric manifestations of AIDS-spectrum disorders. *Hosp Community Psychiatry* 1986; 37:135-142
- Kassel PE: Psychological and neuropsychological dimensions of HIV illness. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 217-240
- O'Dowd MA, Zofnass JS: Neuropsychiatric and psychosocial factors in the rehabilitation of patients with AIDS. In Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 199-216

41. Gutiérrez FJ V, Martínez-Osuna P, Seleznick MJ, Espinoza LR: Rheumatologic rehabilitation for patients with HIV, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 77-94
42. Thornhill HL, Demosthenes A, VanBoch-Staele PG: Lower limb amputations associated with parenteral drug abuse (Abstr). *Arch Phys Med Rehabil* 1987; 68:592
43. Glass CA: Orthotic and prosthetic management of the AIDS or infectious patient. *Orthotics Prosthetics* 1988; 41:71-72
44. Make BJ: Pulmonary rehabilitation: Myth or reality? *Clin Chest Med* 1986; 7:519-540
45. King AC, Taylor CB, Haskell WL, Debusk RF: Strategies for increasing early adherence to and long-term maintenance of home-based exercise training in healthy middle-aged men and women. *Am J Cardiol* 1988; 61:628-632
46. Scheinberg L, Smith CS: Rehabilitation of patients with multiple sclerosis. *Neurol Clin* 1987; 5:585-600
47. Bacchetti P, Moss AR: Incubation period of AIDS in San Francisco. *Nature* 1989; 338:251-253
48. Medicare Hospital Manual, Coverage of Hospital Services, §211, revised. Washington, DC, Health Care Financing Administration, February 1990, pp 25k-25m.2
49. Carpenter NW: AIDS initiatives in Massachusetts: Building a continuum of care, *In* O'Malley P (Ed): *The AIDS Epidemic*. Boston, Mass, Beacon Press, 1989, pp 429-439
50. Coleman E, Sharp JW: AIDS and the social work role, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 359-370
51. Meisenhelder JB: Home health care for persons with HIV infection, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 405-424
52. Council on Scientific Affairs: Home care in the 1990s. *JAMA* 1990; 263:1241-1244
53. Shega JM: Education for the care provider and the community, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 393-404
54. Villarino ME, Beck-Sague C, Jarvis WR (CDC): AIDS, infection control, and employee health: Considerations in rehabilitation medicine, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 371-392
55. Senak MS: The legal and ethical aspects of HIV infection, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 437-450
56. Bayer R: AIDS: The right to care, the right to privacy, *In* Mukand J (Ed): *Rehabilitation for Patients With HIV Disease*. New York, NY, McGraw-Hill, 1991, pp 425-436